SURFACE MOUNT

SPDT RF Switch

JSW2-33DR-75+

75Ω 5 to 3000 MHz Reflective RF Switch with Internal Driver
Single Supply Voltage, + 2.3 V to +4.8 V, High Power, 3 W

THE BIG DEAL

- High Isolation, 42 dB Typ. at 1 GHz
- Low Insertion Loss, 0.38 dB Typ. at 1 GHz
- High IP3, +56 dBm Typ. at 1 GHz
- Low Current Consumption, 37 µA Typ.
- High Power, P0.1dB 3 W



Generic photo used for illustration purposes only

CASE STYLE: MT1818

+RoHS Compliant
The +Suffix identifies RoHS Compliance.
See our website for methodologies and qualifications

APPLICATIONS

- CATV Systems
- SATCOM System
- Automated Test Stations

PRODUCT OVERVIEW

The JSW2-33DR-75+ is a high-power reflective SPDT RF switch, with reflective short on output ports in the OFF state. Made using a Silicon-on-Insulator process, it provides very high IP3 (+55 dBm typ.). This switch also has a built-in CMOS driver and negative voltage generator, all packaged in a tiny 2 x 2 mm package, enabling it to operate over wideband and fit into tight spaces.

KEY FEATURES

Features	Advantages
Wideband Operation, 5 to 3000 MHz	Enables a single component to be used in a vast array of applications from VHF up to 3000 MHz.
High IIP3, +55 dBm Typ.	Results in little or negligible inter-modulation generation, meeting requirements for digital communication signals.
Low Insertion Loss, 0.38 dB at 1 GHz & High Input Power, 3 W	Low insertion loss and high power capability enables a single switch to be used for a variety of applications, saving inventory.
Built-In Negative Voltage Generator	Operates with single positive supply voltage; no need for DC blocking capacitors, unless external DC is present at the RF ports.
Built-In CMOS Driver	No need for external driver, saving PCB space and cost.
Tiny MCLP Package, 2 x 2 mm, 12-Lead	Provides low inductance, repeatable transitions, and excellent thermal contact to PCB.

REV. D
ECO-026600
JSW2-33DR-75+
MCL NY
260429

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RF ELECTRICAL SPECIFICATIONS[1], T_{AMB} = +25°C, V_{DD} = +2.3 V TO +4.8 V

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		5		3000	MHz
Insertion Loss[2] (ON STATE)	5-1000	–	0.38	0.48	dB
	1000-1500	–	0.48	0.58	
	1500-2000	–	0.54	0.64	
	2000-3000	–	0.53	0.64	
Isolation Between Common Port and RF1 / RF2 Ports	5-1000	40	42	–	dB
	1000-1500	35	38	–	
	1500-2000	32	35	–	
	2000-3000	28	31	–	
Isolation Between RF1 and RF2 Ports[3]	5-1000	40	45	–	dB
	1000-1500	35	41	–	
	1500-2000	32	37	–	
	2000-3000	28	32	–	
Return Loss (ON STATE), All Ports	5-1000	–	19	–	dB
	1000-1500	–	16	–	
	1500-2000	–	16	–	
	2000-3000	–	17	–	
Input IP3 (V_{DD} = +3 V)	5-1000	–	+56	–	dBm
	1000-1500	–	+62	–	
	1500-2000	–	+63	–	
	2000-3000	–	+63	–	
0.1 dB Input Compression[4]	5-3000	–	+35.0	–	dBm

1. Tested on Mini-Circuit's test board TB-723-F+ (see Characterization Test Circuit, Fig.1).
2. Insertion loss values include test board loss.
3. Enable voltage "HI", either RF1 or RF2 are ON.
4. Do not exceed RF input power as shown in Absolute Maximum Rating table.

DC OPERATING ELECTRICAL SPECIFICATIONS

Parameter	Min.	Typ.	Max.	Units
V_{DD}, Supply Voltage	+2.3	–	+4.8	V
Supply Current	–	37	–	µA
Control Enable Voltage Low	0	–	+0.4	V
Control Enable Voltage High	+1.65	–	V_{DD}	V
Control Current	–	1	–	µA
Shutdown Mode - Supply Current	–	7	–	µA

SWITCHING SPECIFICATIONS

Parameter	Min.	Typ.	Max.	Units
Rise/Fall Time (10 to 90% or 90 to 10% RF)	–	0.5 (Rise Time) 0.7 (Fall Time)	–	µSec
Switching Time, 50% CTRL to 90/10% RF	–	1.9 (ON Time) 1.1 (OFF Time)	–	µSec
Video Feed-Through, (Control 0 to +1.65 V, Freq. = 10 KHz)	–	3.0	–	mV_{P-P}

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ABSOLUTE MAXIMUM RATINGS[5]

Parameter	Ratings
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +125°C
V_{DD}, Supply Voltage	+5.0 V
Voltage Control	-0.2 V min. V_{DD} max.
RF Input Power[6]	5 W

5. Operation of this device above any of these conditions may cause permanent damage.
6. Derate linearly to 2.5 W at +85°C.

TRUTH TABLE

(State of control and enable voltage selects the desired switch state)

State of:		RF Common to	
Control Voltage	Enable Voltage	RF1	RF2
High	High	ON	OFF
Low	High	OFF	ON
Low/High	Low	Shutdown	

ON - Low insertion loss state
OFF - Isolation state

CHARACTERIZATION TEST CIRCUIT

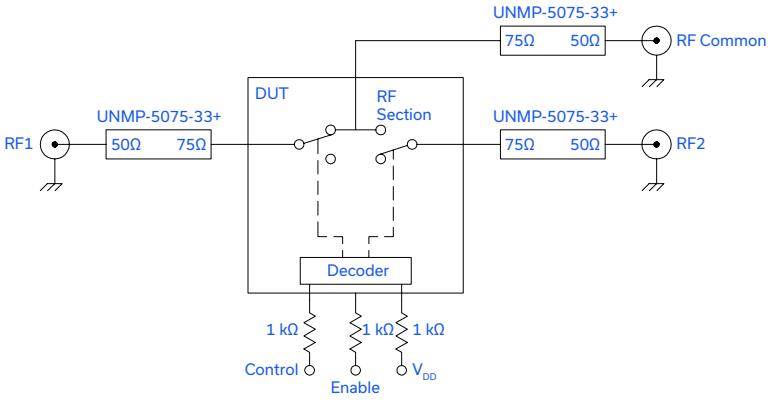


Figure 1: Block Diagram of Test Circuit Used for Characterization (DUT soldered on Mini-Circuit's TB-723-F+)

Test Equipment:

For Insertion Loss, Isolation, Return Loss:
Agilent's N5230A Network Analyzer , E3631A power supply.
Mini-Circuits Matching Pad UNMP-5075-33+

For Switching Time and Video Feed Through:
Agilent's AG54832B HP81110A pulse generator, HPE3631A Network Analyzer , E3631A power supply.
Agilent's N90A Spectrum Analyzer , E8257D Generator U200A

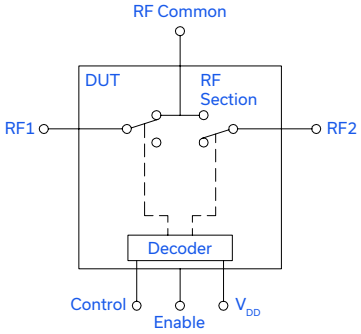
For Compression:
R&S Network Analyzer ZVA24, E3631A power supply

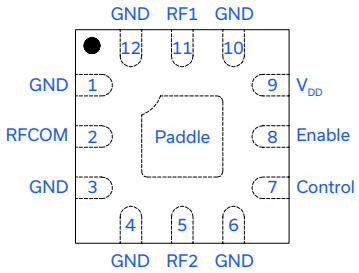
Conditions:
V_{DD} = +2.3 V and +4.8 V, Control = 0 and +1.65 V
For Insertion Loss, Isolation and Return Loss: P_{IN} = 0 dBm
For Input IP3: P_{IN} = +10 dBm/tone
For Switching Time: RF Frequency: DC at 0 dBm, Control Frequency: 500 KHz and 0 and +1.65 V

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SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION





Function	Pad Number	Description
RF COM	2	RF Common/SUM Port, (see Fig. 2)
RF1	11	RF Out #1/In Port #1, (see Fig. 2)
RF2	5	RF Out #1/In Port #2, (see Fig. 2)
Control	7	CMOS Control IN
V_{DD}	9	Supply Voltage
Enable	8	Shutdown mode enabled by connecting to logic low
GND	1,3,4,6,10,12	Ground

RECOMMENDED APPLICATION CIRCUIT

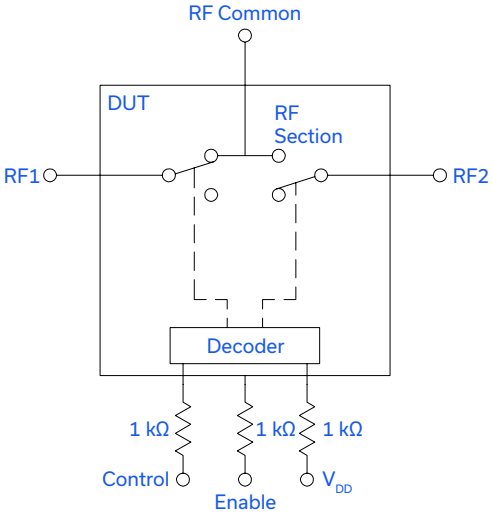
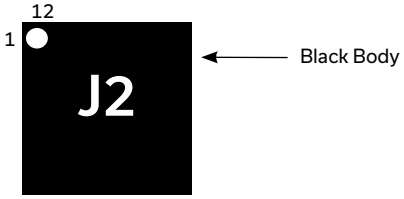


Figure 2. Evaluation board includes case, connectors and components soldered to PCB.

PRODUCT MARKING



Marking may contain other features or characters for internal lot control.

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ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. TO ACCESS CLICK HERE

Performance Data	Data Table Swept Graphs
Case Style	MT1818 Plastic package, Lead Finish: NiPdAu
Tape & Reel **Standard Quantities Available on Reel**	F108 7" Reels with 20, 50, 100, 200, 500, 1000, 2000, or 3000 devices
Suggested Layout for PCB Design	PL-415
Evaluation Board	TB-723-F+
Environmental Ratings	ENV75

ESD RATING

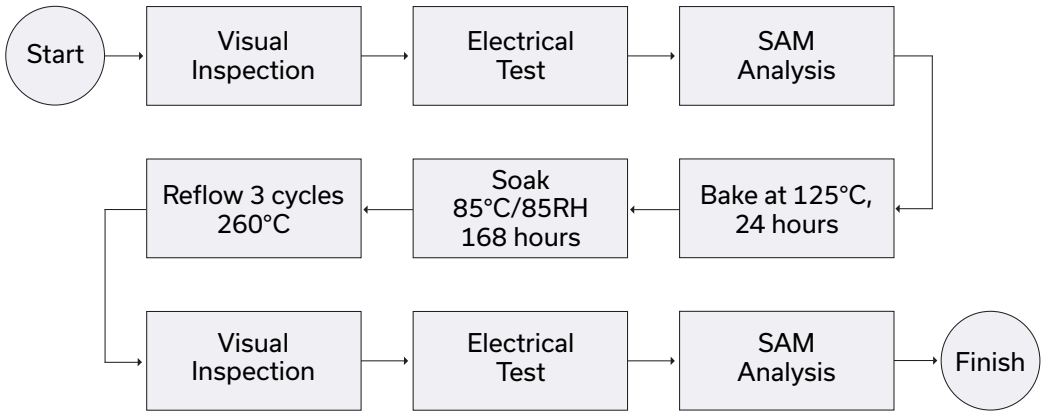
Human Body Model (HBM): Class 1B (500 to < 1000 V) in accordance with JESD22-A114

Machine Model (MM): Class A (Pass 100 V) in accordance with JESD22-A115

MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

MSL TEST FLOW CHART



NOTES

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/terms/viewterm.html